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LOCOMOTIVE

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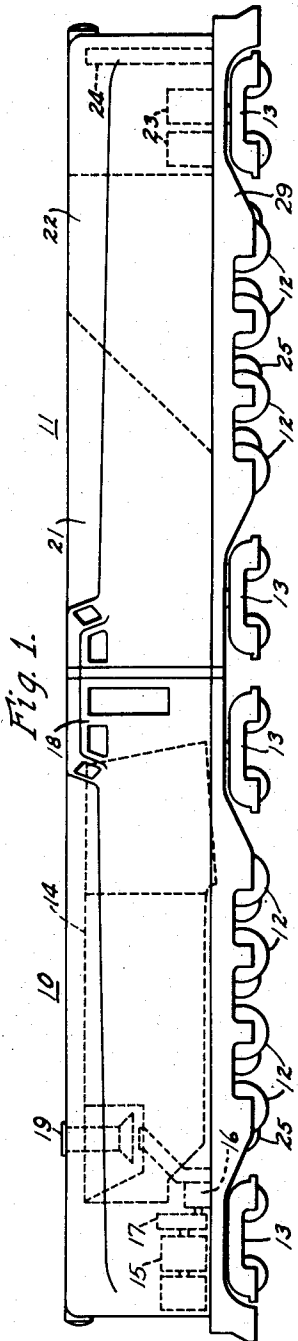


Fig. 1.

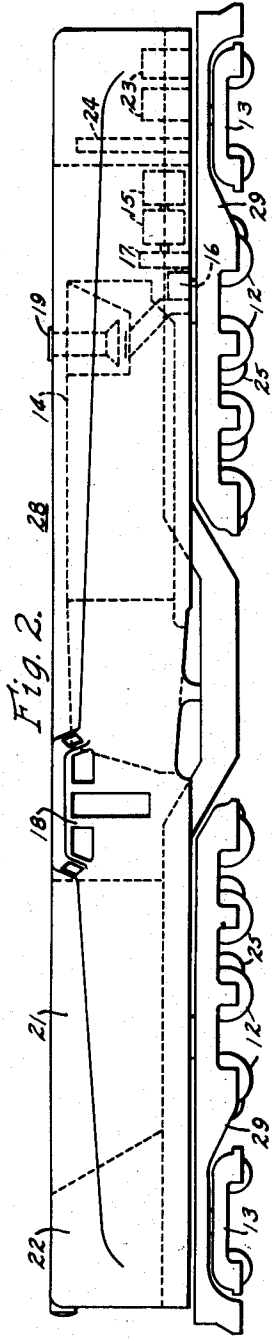


Fig. 2.

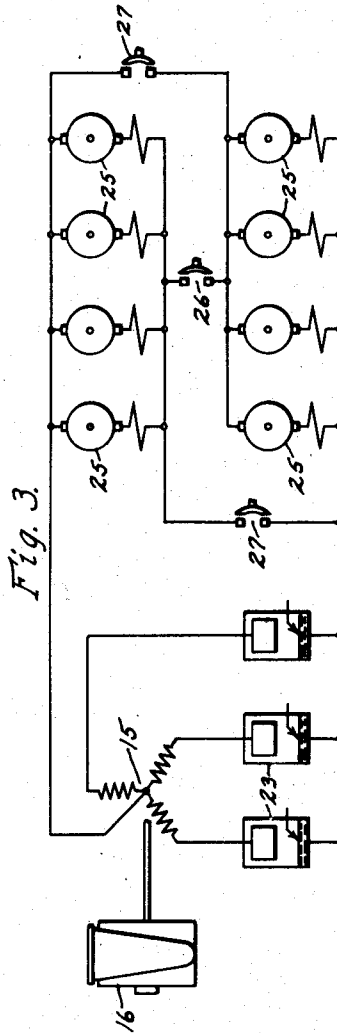


Fig. 3.

WITNESSES:

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# UNITED STATES PATENT OFFICE

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## LOCOMOTIVE

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3 Claims. (Cl. 290—14)

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Our invention relates, generally, to locomotives and, more particularly, to turbo-electric locomotives.

An object of our invention, generally stated, is to provide a turbo-electric locomotive which shall be simple and efficient in operation and which may be economically manufactured and used.

A more specific object of our invention is to provide a turbo-electric locomotive in which a turbo-generator operates at a substantially constant speed.

Another object of our invention is to provide a turbo-electric locomotive having an alternating-current generator and direct-current traction motors.

A further object of our invention is to provide a turbo-electric locomotive having suitable characteristics for both freight and passenger service.

Other objects of our invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of our invention, the power for operating a locomotive is supplied by a turbo-generator set which operates at a substantially constant speed generating three-phase alternating current at a constant frequency. The alternating current is converted by rectifiers into direct current for the traction motors which may be connected in series for freight service and in parallel for passenger service.

For a fuller understanding of the nature and objects of our invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a view, in elevation, of a locomotive embodying the principal features of our invention;

Fig. 2 is a view, in elevation, of a modification of the locomotive structure; and

Fig. 3 is a diagrammatic view showing the main circuit connections for the machines utilized in the locomotive.

Referring now to the drawing, and particularly to Figure 1, the locomotive shown therein comprises two units 10 and 11, each unit having a plurality of driving wheels 12 and a guiding truck 13 at each end of each unit, thereby making the locomotive suitable for operation at high speed in either direction. A boiler 14, a plurality of alternating-current generators 15 which are driven by a steam turbine 16 through a reduction gear unit 17 and an operator's compartment 18 are disposed in the unit 10. As shown, the tur-

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bine 16 is so located that it exhausts almost directly through a smoke stack 19 for the boiler 14, thereby making it unnecessary to provide a large amount of exhaust piping.

The unit 11 contains a fuel compartment 21, a water compartment 22, rectifiers 23, which are preferably of the igniting type, and control apparatus 24 for the rectifiers 23. The turbo-generator set may be so controlled by a governor for the turbine that it operates at constant speed, thereby generating three-phase alternating current at a constant frequency.

As shown by the diagram in Fig. 3, the rectifiers 23 are utilized to convert the alternating current into direct current for traction motors 25 which drive the driving wheels 12. The motors 25 are disposed in two groups with four parallel-connected motors in each group. A switch 26 is provided for connecting the two groups of motors in series-circuit relation and two switches 27 are provided for connecting the motors in parallel-circuit relation. The voltage applied to the motors may be controlled either by varying the excitation of the generator or by voltage control of the rectifiers 23.

Thus, the motors may be connected in series for freight operation and in parallel for passenger operation, thereby providing a locomotive suitable for both freight and passenger service. Furthermore, the speed control of the locomotive is quite simple and the advantages of alternating-current generation are obtained along with the advantages of direct-current traction motors.

In the modification of the invention shown in Fig. 2, apparatus similar to that illustrated in Fig. 1 is disposed in a single cab 28 which is supported by two main truck frames 29. The turbine 16, generators 15, rectifiers 23 and control apparatus 24 are all located at the same end of the locomotive, the fuel and water compartments being at the other end. The motors 25 may be connected and controlled in the manner hereinbefore described. It will be understood that other wheel arrangements and equipment layouts may be utilized, if desired.

From the foregoing description, it is apparent that we have provided a turbo-electric locomotive having numerous advantages. Thus, the advantages of electric traction motors are obtained and the entire adhesive weight of both locomotive and tender can be utilized when necessary. By connecting the motors either in series or in parallel, a very satisfactory freight or passenger locomotive can be obtained.

Since numerous changes may be made in the

above-described construction and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

We claim as our invention:

1. In a locomotive power system, in combination, a three-phase alternating-current generator disposed in the locomotive, said generator having a neutral connection, turbine means disposed in the locomotive for driving the generator, a rectifier connected to each phase of the generator for converting the generator current from alternating to direct current, a common connection for all of said rectifiers, a plurality of groups of traction motors, the motors in each group being connected in parallel-circuit relation, and switching means for connecting the groups of motors to the generator neutral connection and the common connection for the rectifiers in either series-circuit relation or parallel-circuit relation.

2. In a locomotive power system, in combination, a three-phase alternating-current generator disposed in the locomotive, said generator having a neutral connection, turbine means disposed in the locomotive for driving the generator, at least one rectifier connected to each phase of the generator for converting the generator current from alternating to direct current, a common connection for all of said rectifiers, a plurality of groups of traction motors, the motors in each group being connected in parallel-circuit relation, switching means for connecting the groups of motors to the generator neutral connection and the common connection for the rectifiers in either series or parallel-circuit relation, and means for controlling the operation of the rectifiers.

3. In a locomotive power system, in combination, a three-phase alternating-current generator disposed in the locomotive, said generator having

a neutral connection, turbine means disposed in the locomotive for driving the generator, a rectifier connected to each phase of the generator for converting the generator current from alternating to direct current, a common connection for all of said rectifiers, two groups of parallel-connected motors, and switching means for connecting said groups of motors to the generator neutral connection and the common connection for the rectifiers in either series circuit relation or parallel-circuit relation.

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